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Popular Article

One Health Concept in Veterinary Parasitology

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Introduction

One Health concept refers to ‘the collaborative efforts of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and our environment’ (AVMA, 2008). One Health began in the late 19th and 20th centuries with Rudolph Virchow, known as the “Father of comparative medicine, cellular pathology, and veterinary pathology” and William Osler, called the “Father of Modern Medicine”. One Health is an approach that recognizes that the health of the people is closely connected to the health of animals and our shared environment. It also encourages the collaborative efforts of many experts (disease detectives, laboratorians, physicians, and veterinarians) working across human, animal, and environmental health to improve the health of people and animals.

One Health effectively fights health issues at the human-animal-environment interface. One Health approach identifies - Zoonotic diseases, food safety and security, drug resistance, vector-borne diseases, environmental contamination, and other health threats shared by people, animals, and the environment. CDC uses a One Health approach in monitoring and controlling public health threats. New and reemerging zoonoses have evolved partly because of the increasing interdependence of humans on animals. 75% of new emerging human infectious diseases are zoonotic, *i.e.*, “naturally transmitted from vertebrate animals to humans”, and have an important impact on human health. For example- Cryptosporidiosis (Kimani *et al.*, 2012). Hence, zoonoses should be considered the single most critical risk factor for human health and well-being.

Parasitologists, of all the health professional scientists, are generally most familiar with the long list of parasitic zoonoses. Hence, the critical need for One Health research collaborations and cooperation. (Kaplan *et al.*, 2009). Endoparasite (and ectoparasite) infections and infection rates for animals are of much greater volume as compared with humans. Thus, the epidemiologic prevention,

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diagnosis, treatment, and control needs of animals exceed those of humans.

Factors that influence the occurrence of parasitic zoonoses

- Climate change and global warming.
- Vector population.
- Poverty, lack of safe drinking water.
- Presence of stray animals, defecating outdoors.
- Poor personal hygiene, high population density, and inadequate sanitation (Singh *et al.*, 2011)
- Most animals live in close contact with man.
- Movement of people, animals, and animal products has increased from international travel and trade.

Parasitic zoonoses

Parasitic zoonoses include parasitic infections whose life cycle involves vertebrate hosts and humans. For example- Human acts as D.H.- Taeniasis and I.H – Hydatidosis. Wildlife is also recognized as a reservoir of human diseases for most of parasitic zoonoses, like American and African Trypanosomosis, and leishmaniasis. Contaminated food, water, soil, infected man, infected animal, and vectors acts as a source of infection. The modes of transmission include oral or faeco-oral route, biting of vectors, penetration of the skin and mucous membranes, blood transfusion, and autoinfection. Meat-borne zoonoses are typically caused by *Taenia solium*, *Taenia saginata* (Singh *et al.*, 2002), *Echinococcus granulosus*, *Trichinella spiralis* (Gajadhar *et al.*, 2006), *Sarcocystis*, and *Toxoplasma gondii*. Anisakiasis (Chai *et al.*, 2005), Clonorchiasis, Opisthorchiasis, Heterophyiasis, and Diphyllbothriosis are fish-borne zoonoses. Paragonimiasis is a crustacean borne zoonoses. *Fasciolopsis buski* (Mas-Coma *et al.*, 2005), eggs of *Ascaris*, infective cysts of *Entamoeba histolytica*, and *Giardia spp* are transmitted to human beings through soiled vegetables. Schistosomes and Ancylostomes are transmitted through skin penetration and scabies through direct physical contact. Certain zoonoses are particularly associated with aerosol inhalation, contaminated water. Ex: Cryptosporidiosis and Giardiasis.

Vector-borne zoonotic parasites

Parasite	Vector involved	Disease
<i>Trypanosoma brucei</i>	<i>Glossina flies</i>	Sleeping sickness, Nagana
<i>Trypanosoma cruzi</i>	<i>Triatoma bugs</i>	Chagas disease
<i>Leishmania tropica</i>	<i>Phlebotomus sergenti</i>	Delhi boil
<i>Leishmania donovani</i>	<i>Phlebotomus argentipes</i>	Kala-Azar/Dum-dum fever
<i>Dirofilaria immitis</i>	<i>Mosquito</i>	Zoonotic filariasis
<i>Dipylidium caninum</i>	<i>Ctenocephalides canis, C.felis</i>	Dipylidiasis
<i>Plasmodium spp</i>	<i>Anopheles</i>	Simian malaria



Occupational parasitic zoonoses

Occupational zoonotic diseases are most common where there is close contact between animals and humans at work. Millions of people worldwide engage in occupational activities involving animals, including – farm workers, workers in meat processing industry, fisheries, kennels, pet trade, grooming facilities, zoos, animal clinics, research laboratories, wastewater industry, and those carrying out cleaning and decontamination practices, they contract the diseases during an occupation as a result of exposure to parasitic agents.

Disease	Occupation
Hydatidosis	Dog handlers, Veterinarians
Toxoplasmosis	Cat owners
Cryptosporidiosis, Giardiasis	Sewage workers, Dairy farmers
Schistosomosis	Fisherman, labourers in irrigated fields

Laboratory diagnosis

Microscopic detection of parasitic stages in faeces, blood, urine, sputum, aspirate and biopsy. Cultivation - In-vivo and Invitro, serological and molecular techniques are used for the diagnosis of zoonotic diseases.

- ▶ In human beings, diagnostic tests like Sabin Feldman's dye test for Toxoplasmosis, Casoni’s test for Hydatidosis, and Montenegro test for Leishmaniasis were conducted.

Approaches employed for prevention and control of zoonoses

- ▶ Good sanitation, hygiene during food preparation, adequate cooking, and thorough washing of vegetables.
- ▶ Boiled, filtered water. Avoid accidental ingestion of lake or stream water.
- ▶ Protective clothing, wearing gloves, boots when gardening, and working with animals.
- ▶ Prevent spread by man – By isolation, prevent animal contact, and proper treatment of disease.
- ▶ Protective measures in veterinary hospitals.
- ▶ Protect high risk groups – health education, monitoring the health status.
- ▶ Establish food safety- Hygiene in animal production, slaughter, handling, and processing of foodstuffs.
- ▶ Safe disposal of animal carcasses and garbage.
- ▶ Control of vectors and reservoirs.
- ▶ Provision of clean food and water to animals.
- ▶ Remove faeces from animal enclosures frequently, and avoid overcrowding of animals.
- ▶ Healthy animals should not be in close contact with sick animals.
- ▶ Deworm and vaccinate animals. Early diagnosis and treatment of sick animals.

Conclusion

The areas of work in which a One Health approach is particularly relevant to food safety and the control of zoonoses. Many of the same parasites infect animals and humans, as they share the



ecosystems, they live in. Efforts by just one sector cannot prevent or eliminate the problem. So, through one health approach, multiple sectors communicate and work together to achieve better health outcomes and, in the prevention, and control of zoonoses. Disease surveillance, food and water safety, control of vectors and disease reservoirs, deworming, vaccination, treatment of infected animals, and response to public health outbreaks need to be strengthened.

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